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REFRIGERATION AND AIR CONDITIONING AND HEATING SYSTEMS CAREER L--ETC(U)
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9 OCCUPATIONAL SURVEY REPORT.

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6 REFRIGERATION AND AIR CONDITIONING AND
HEATING SYSTEMS CAREER LADDERS

AFSCs 545X0, 547X0, 54790 .

14 AFPT-90-545-274, AFPT-90-547-275

30 SEPTEMBER 1977

OCCUPATIONAL SURVEY BRANCH
USAF OCCUPATIONAL MEASUREMENT CENTER
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PREFACE

This report presents the results of a detailed Air Force Occupational Survey of the Refrigeration and Air Conditioning and Heating Systems career ladders (AFSCs 54530, 54550, 54570, 54730, 54750, 54770, and 54790). The project was directed by USAF Program Technical Training, Volume 2, dated April 1976. Authority for conducting specialty surveys is contained in AFR 35-2. Computer outputs from which this report was produced are available for use by operating and training officials.

The survey instrument was developed by Mr. Reginald G. Nolte, Inventory Development Specialist. Mr. James B. Keeth analyzed the survey data and wrote the final report. This report has been reviewed and approved by Major Walter F. Kasper, Chief, Operations/Support Career Ladders Analysis Section, Occupational Survey Branch, USAF Occupational Measurement Center, Lackland AFB, Texas, 78236.

Computer programs for analyzing the occupational data were designed by Dr. Raymond E. Christal, Occupational and Manpower Research Division, Air Force Human Resources Laboratory (AFHRL), and were written by the Project Analysis and Programming Branch, Computational Sciences Division, AFHRL.

Because volume reproduction of this report is not feasible, distribution is made on a loan basis to air staff sections and major commands upon request to the USAF Occupational Measurement Center, attention of the Chief, Occupational Survey Branch (OMY), Lackland AFB, Texas 78236.

This report has been reviewed and is approved.

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SUMMARY OF RESULTS

1. Survey Coverage: Survey results are based on responses from 66 percent of the personnel assigned to the Refrigeration and Air Conditioning career ladder (AFSC 545X0), 63 percent of the personnel assigned to the Heating Systems career ladder (AFSC 547X0), and 85 percent of the assigned Mechanical Superintendents (AFSC 54790).

2. Career Ladder Structure: Ninety-six percent of the survey respondents comprised five major groups. These groups were identified as:

- I. Refrigeration and Air Conditioning Specialists (GRP038)
- II. Heating Systems Specialists (GRP044)
- III. Supervisory Personnel (GRP040)
- IV. Training Instructors (GRP061)
- V. Fuel Area NCOs (GRP147)

3. DAFSC Differences: In the Refrigeration and Air Conditioning career ladder (AFSC 545X0), task performance at both the 3- and 5-skill levels was found to be almost identical in terms of tasks performed and time spent on the major duties. At the 7-skill level, there is a clear shift in job emphasis toward the exercise of supervisory responsibilities with many of these incumbents serving as first-line supervisors. However, as first-line supervisors, incumbents continue to spend a large part of their job time performing technical tasks. This task performance pattern also holds true for Heating Systems personnel (AFSC 547X0). At the 9-skill level, supervisory and managerial duties take up over 90 percent of the job time. Very little time is spent on technical tasks dealing with refrigeration, air conditioning, or heating systems.

4. Comparison of Refrigeration and Air Conditioning Systems (AFSC 545X0) And Heating Systems (AFSC 547X0) Career Ladders: Only 32 of the 495 tasks in the job inventory were being performed by 40 percent or more of the personnel in both career ladders. Generally, these tasks seemed to require the same common knowledges of mechanical and electrical equipment regardless of system specialization. Equipment commonality between the two career ladders was found to be low, with very few items of equipment being used by 30 percent or more of the incumbents in both career ladders.

5. AFR 39-1 Evaluation: All job descriptions were found to reflect an accurate picture of the jobs performed by personnel in each career ladder.

STS Evaluation: In a general sense, the 545X0 covers the major aspects of the Refrigeration and Air Conditioning career ladder. However, some significant inadequacies were noted in the task statements listed under many of the STS paragraphs. In particular, some commonly performed tasks relating to supervision and training should be added to paragraph 2 of the

STS. In addition, the listing of task statements under each STS paragraph seemed confusing and at times repetitious. It appears these could be rewritten into clearer and more concise statements.

Tasks listed in the 547X0 STS were also well supported by the survey data. However, a number of commonly performed inventory tasks were not directly covered in several of the STS paragraphs. In addition, the area concerning the maintenance and servicing of gas distribution systems was completely omitted from the STS although the survey data showed several key tasks from this area being performed by a substantial number of 547X0 respondents.

7. Job Satisfaction: Seventy-one percent of all 545X0 incumbents and 72 percent of all 547X0 incumbents indicated that their job was interesting. In addition, 76 to 80 percent of the incumbents in both ladders indicated that their talents and training were being well utilized. While these figures are relatively high, they are somewhat lower than the figures found for incumbents in the 22 career ladders surveyed in 1976.

8. Reenlistment Intentions: Approximately 51 percent of first-term airmen in both career ladders indicated no plans to reenlist. Fifty-seven and 65 percent of second-term and career airmen in the 545X0 career ladder expressed similar intentions. Actual first-term reenlistment rates for the first nine months of FY 77 closely parallel expressed intentions. However, the reenlistment rates for second-term and career airmen were much higher than expressed intention.

OCCUPATIONAL SURVEY REPORT
REFRIGERATION AND AIR CONDITIONING AND HEATING SYSTEMS
CAREER LADDERS
(AFSCs 545X0, 547X0, 54790)

INTRODUCTION

This is a report of an occupational survey of the refrigeration and air conditioning (AFSC 545X0) and heating systems (AFSC 547X0) career ladders conducted by the Occupational Survey Branch, USAF Occupational Measurement Center, from May 1976 through September 1977. The previous occupational survey of these career ladders was completed in March 1971.

This report describes: (1) development and administration of the survey instrument; (2) summaries of tasks performed by airmen grouped by skill level, experience level, and similarity of tasks performed; (3) comparisons with current career field structure documents; and (4) recommended actions for further study.

Both career ladders have remained relatively stable over the years since the last occupational survey was completed in 1971. The only major classification change that has occurred since that time involved dropping the A shredout, Plant Operator, for the 547X0 career ladder in April 1976.

INVENTORY DEVELOPMENT AND ADMINISTRATION

The data collection instrument for this occupational survey was USAF job inventory AFPT 90-545-274 and 90-547-275. Thorough research of career field publications and directives, personal interviews with 13 subject matter specialists at three bases, and written reviews from 61 experienced refrigeration and air conditioning and heating systems personnel in the two career ladders involved led to final development of the survey instrument, which consists of 495 task statements grouped under 20 duty headings.

During the period February through June 1977, consolidated base personnel offices in operational units worldwide administered the inventory booklets to 1,090 job incumbents holding DAFSC 545X0, or 66 percent of the total assigned AFSC 545X0 personnel. Inventory booklets were also administered to 1,034 incumbents holding DAFSC 547X0, or 63 percent of the total assigned DAFSC 547X0 personnel. Seventy-three of the 86 9-skill level superintendents, or 85 percent of the total assigned, were also sampled.

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Table 1 reflects the percentage distribution, by major command, of assigned personnel in each of the career ladders surveyed as of April 1977. Also reflected is the distribution by major command of incumbents making up the final survey sample. This sampling of career ladder members is considered to be an adequate and representative sample of the overall populations.

TABLE 1
COMMAND REPRESENTATION

COMMAND	545X0		547X0		54790	
	PERCENT OF ASSIGNED	PERCENT OF SAMPLE	PERCENT OF ASSIGNED	PERCENT OF SAMPLE	PERCENT OF ASSIGNED	PERCENT OF SAMPLE
TAC	20	20	15	14	7	4
SAC	19	22	22	25	23	26
ADC	13	13	7	5	9	10
ATC	10	10	11	12	9	16
MAC	9	8	14	15	9	7
PACAF	6	5	5	4	8	6
AFSC	5	5	4	3	7	1
USAFE	5	5	7	6	15	16
AFCS	4	4	1	1	1	1
AFLC	3	3	4	4	7	4
AAC	3	2	7	5	1	3
USAFSS	2	2	1	1	1	-
OTHERS	1	1	2	5	3	6

Total 545X0 Incumbents Assigned - 1,651

Total 545X0 Incumbents Sampled - 1,090

Percent of 545X0 Incumbents Sampled - 66%

Total 547X0 Incumbents Assigned - 1,651

Total 547X0 Incumbents Sampled - 1,034

Percent of 547X0 Incumbents Sampled - 63%

CAREER LADDER STRUCTURE

The job structure of the Air Conditioning and Refrigeration (AFSC 545X0) and Heating Systems (AFSC 547X0) career ladders was examined on the basis of similarities in the tasks performed by incumbents in the field, independent of DAFSC or other background factors. The computer printouts used in this part of the analysis helped identify: (1) tasks which tend to be performed by the same incumbents; (2) the breadth or narrowness of jobs performed in the field; and (3) tasks and background characteristics used in distinguishing among different jobs within the career field. Structure analysis therefore provided an objective indication of the amount of task overlap among the various groups of incumbents included in the survey sample.

Based on task similarity, the best division of the jobs performed in the AFS 545X0 and 547X0 career ladders is illustrated in Figure 1. These jobs are identified below. The GRP numbers shown with each group is a reference to computer printed information included for use by classification and training officials.

- I. Refrigeration and Air Conditioning Specialists (GRP038, N=962)
- II. Heating Systems Specialists (GRP044, N=924)
- III. Supervisory Personnel (GRP040, N=216)
- IV. Training Instructors (GRP061, N=24)
- V. Fuel Area NCOs (GRP147, N=5)

Ninety-six percent of the incumbents in the sample were found to perform jobs roughly equivalent to those described in the five major groupings listed above. The remaining four percent of the sample included members whose jobs were not associated with any of these major groupings. These "isolates" were found to represent commands and AFSCs fairly equally and to share no single common characteristic.

The refrigeration and air conditioning group (GRP038) was very homogeneous in terms of task performance. Members perform a large core of common tasks covering a wide spectrum of jobs. Refrigeration and air conditioning specialists perform seasonal or recurring maintenance on various systems; maintain air conditioning and refrigeration system components such as filters, bearings, drive belts, fans, air handling units, and couplings or pulleys; and maintain electrical systems. In addition, some members are responsible for operating centrifugal air conditioning plants and central heat/air conditioning plants where tasks involving water treatment and boiler maintenance are prevalent. The basic differences noted between the various subgroups making up the overall air conditioning and refrigeration group are in terms of the number of tasks performed, time spent per task, and whether or not the members are first-line supervisors or technicians. Task differences are minimal.

The heating systems group (GRP044) also showed little difference among the various subgroups. Incumbents perform routine and seasonal or recurring maintenance on heating systems and maintain and operate steam and hot water heating systems. In addition to the routine maintenance tasks on heating systems components, members also spend much of their time maintaining boilers. This involves inspecting for proper water levels, cleaning boiler tubes, inspecting steam or condensate lines for leaks, draining boilers, and maintaining steam pressure. Also, those members identified as heating plant or boiler operators are more involved in the treating and testing of boiler water. This requires them to test water for such things as causticity, phosphates, tannin, total dissolved solids, and dissolved oxygen. Several groups of first line supervisors or technicians were also identified within the overall group of heating systems specialists.

The supervisory personnel group (GRP040) included primarily 7-level technicians from both the 545X0 and 547X0 groups, and 9-skill level mechanical superintendents. Most of their jobs involve the performance of primarily supervision tasks as opposed to the technical jobs performed by the first line supervisors found in the various groups discussed earlier. These members counsel personnel, evaluate performance of subordinates, complete airman performance reports, orient newly assigned personnel, and schedule work assignments. In other words, they are involved with the day-to-day supervision of the base civil engineering branch or respective air conditioning and refrigeration or heating shop. Almost no technical tasks are performed by this group.

The training instructors (GRP061) spend almost half their time in training functions. They are primarily instructors at the ATC technical training center who conduct classroom training, prepare lesson plans, demonstrate operation of equipment, and counsel individuals on training progress.

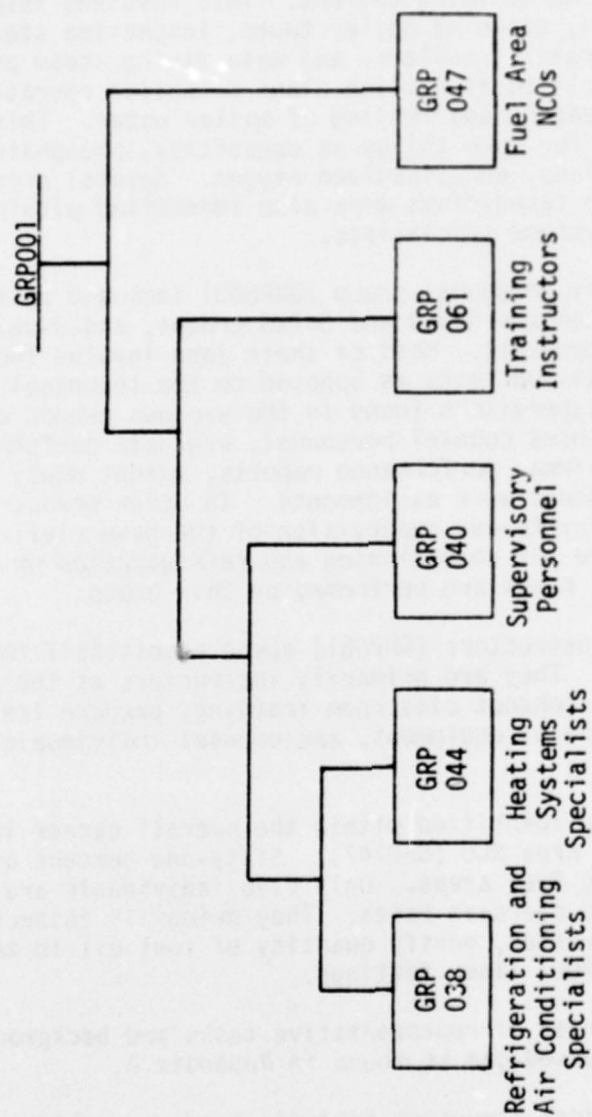
The final group identified within the overall career ladder structure is that of the Fuel Area NCO (GRP147). Sixty-one percent of their time is spent maintaining fuel areas. Only five individuals are in this group; most are assigned to overseas bases. They primarily inspect oil tanks for water or other impurities, verify quantity of fuel oil in tanks, and inspect gas or oil fuel lines fittings.

Complete summaries of representative tasks and background information for each group discussed can be found in Appendix A.

This career ladder structure analysis tends to validate the existing classification structure for these specialties. Based on similarity of tasks performed: almost all 545X0 incumbents group together, almost all 547X0 specialists and technicians cluster together; supervisors are also a separate cluster. Only ATC instructors and the Fuel Area NCOs, both relatively small groups, are not in the basic groups. These are much more discretely clustered groups than are found in most specialties and this suggests that the present AFSC structure is realistic.

FIGURE 1

REFRIGERATION/AIR CONDITIONING AND HEATING SYSTEMS CAREER LADDER STRUCTURE
AFSC 545X0 and AFSC 547X0



ANALYSIS OF DAFSC GROUPS

Tables 2 and 3 reflect the relative percent time spent by members of the various skill level groups on tasks within each duty. Significant trends for each ladder are discussed below.

Refrigeration and Air Conditioning Specialists/Technicians (AFSC 545X0)

AFSC 545X0 incumbents spend over 40 percent of their time performing tasks related to the routine and seasonal maintenance of refrigeration and air conditioning components such as filters, motor or fan bearings, drive belts, and blower bearings; and the maintenance of electrical systems. Also included are tasks involving the servicing and overhauling of major system components such as compressors, condensers, and evaporators. Table 4 lists those tasks performed by 75 percent or more of all 545X0 personnel.

Task performance at both the 3- and 5-skill levels was found to be almost identical in terms of tasks performed and time spent on the major duties. Incumbents in both skill level groups are involved with performing routine maintenance on components and electrical systems and servicing major system components as discussed in above. Tasks which best differentiate between the two skill levels are presented in Table 5. Generally, the differences in percent members performing those tasks listed are small and further reflect the large degree of commonality found between the two skill levels.

At the 7-skill level, there is a clear shift in job emphasis toward the exercise of supervisory responsibilities. Seven-skill level incumbents tend to act as first-line supervisors, performing such tasks as supervising 3- and 5-skill level incumbents, counseling personnel, evaluating performance of subordinates, conducting on-the-job training (OJT), and scheduling work assignments. However, as first-line supervisors, incumbents continue to spend a large part of their job time performing technical tasks. These tasks include analyzing causes of refrigeration or air conditioning systems malfunctions; inspecting, cleaning, or replacing filters; isolating malfunctions in electrical systems; and performing seasonal or recurring maintenance on refrigeration or air conditioning systems.

Table 6 reflects those tasks which best differentiate between 5- and 7-skill level 545X0 personnel. Almost all of these tasks are supervisory in nature.

Heating Systems Specialists/Technicians (AFSC 547X0)

AFSC 547X0 personnel spend 58 percent of their time installing, maintaining, and operating steam and hot water heating systems. An additional seven percent of their time is spent treating and testing water used in boilers. Almost none of their time is spent maintaining refrigeration or air conditioning systems. Table 7 lists those tasks performed by 65 percent or more of all 547X0 incumbents. Many of the tasks involve maintaining boilers, valves, and pumps.

As with 545X0 incumbents, 3- and 5-skill level 547X0 members were found to perform similar tasks. Incumbents in both skill levels are involved with measuring, cutting, threading, or fabricating pipe or copper tubing; cleaning and replacing filters; cleaning and lubricating motor or fan bearings; installing or maintaining oil burners; and maintaining boilers and steam or hot water heating systems. Table 8 lists those tasks which best differentiate between the 3- and 5-skill levels. Most of the tasks listed involve higher level boiler maintenance tasks.

At the 7-skill level, the heating systems technician assumes more of as a supervisory role. This is identical to the trend noted for refrigeration and air conditioning technicians. These incumbents supervise 3- and 5-skill level heating systems specialists, counsel personnel, assign work, conduct on-the-job training (OJT), and evaluate the performance of subordinates. In addition to these supervisory functions, the 7-skill level incumbent also performs technical tasks such as analyzing causes of heating systems malfunctions, inspecting for proper water level in boilers, inspecting operation of heating safety devices, inspecting boiler feed and condensate pumps, blowing down boilers or water columns, and installing or maintaining oil burners. Table 9 lists those tasks which best differentiate between 5- and 7-skill level 547X0 personnel. As expected, these tasks are supervisory in nature.

Mechanical Superintendents (AFSC 54790)

At the 9-skill level, supervisory duties consume 92 percent of the job time (see Table 3). Very little time is spent on technical tasks dealing with refrigeration, air conditioning, and heating systems. Mechanical superintendents spend most of their time performing tasks which involve directing and implementing. These include such tasks as evaluating performance of subordinates, performing random sample inspections of in-progress or completed job orders or work orders, directing flow of work, preparing work order requests, reviewing maintenance records, and evaluating the capability of heating systems shops or refrigeration and air conditioning shops to accomplish assigned tasks.

Comparisons were made between the task performance of DAFSC 54570 and DAFSC 54770 personnel and that of the mechanical superintendent. Differentiating tasks are presented in Tables 10 and 11. As expected, 7-skill level incumbents have high technical task performance versus the high supervisory task performance for 9-skill level incumbents.

TABLE 2

PERCENT TIME SPENT ON DUTIES BY 545X0 DAFSC GROUPS

DUTY	TOTAL 545X0 (N=1,090)	DAFSC 54530 (N=157)	DAFSC 54550 (N=712)	DAFSC 54570 (N=221)
A ORGANIZING AND PLANNING	4	1	2	10
B DIRECTING AND IMPLEMENTING	5	1	3	15
C EVALUATING	3	2	2	8
D TRAINING	3	-	2	9
E MAINTAINING AND SERVICING AIR CONDITIONING SYSTEMS	9	11	10	6
F MAINTAINING AND SERVICING REFRIGERATION SYSTEMS	7	10	8	4
G SERVICING AND OVERHAULING MAJOR COMPONENTS OF REFRIGERATION AND AIR CONDITIONING SYSTEMS	10	11	10	6
H MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING CONTROL SYSTEMS	6	6	7	6
I MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING SYSTEMS COMPONENTS	20	23	21	13
J MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING ELECTRICAL SYSTEMS	12	12	12	8
K INSTALLING AIR CONDITIONING, REFRIGERATION, AND HEATING SYSTEMS	5	5	5	4
L OPERATING AIR CONDITIONING AND REFRIGERATION PLANTS	2	2	2	1
M MAINTAINING EVAPORATIVE COOLERS, CONDENSERS, AND COOLING TOWERS	6	7	6	4
N MAINTAINING AIR COMPRESSOR SYSTEMS	5	6	5	4
O MAINTAINING AND OPERATING STEAM HEATING SYSTEMS	1	1	1	1
P MAINTAINING AND OPERATING HOT WATER HEATING SYSTEMS	-	-	-	-
Q MAINTAINING AND OPERATING HIGH TEMPERATURE HOT WATER HEATING SYSTEMS	-	-	-	-
R MAINTAINING FUEL AREAS	-	-	-	-
S TREATING AND TESTING WATER	1	1	1	1
T MAINTAINING AND SERVICING GAS DISTRIBUTION SYSTEMS	-	-	-	-

TABLE 3

PERCENT TIME SPENT ON DUTIES BY 547X0 DAFSC GROUPS

DUTY	TOTAL 547X0 (N=1,034)	DAFSC 54730 (N=141)	DAFSC 54750 (N=727)	DAFSC 54770 (N=166)	DAFSC 54790 (N=73)
A ORGANIZING AND PLANNING	3	1	2	11	26
B DIRECTING AND IMPLEMENTING	5	1	3	19	33
C EVALUATING	3	1	2	8	24
D TRAINING	3	-	2	9	10
E MAINTAINING AND SERVICING AIR CONDITIONING SYSTEMS	-	1	1	-	2
F MAINTAINING AND SERVICING REFRIGERATION SYSTEMS	-	-	-	-	-
G SERVICING AND OVERHAULING MAJOR COMPONENTS OF REFRIGERATION AND AIR CONDITIONING SYSTEMS	-	-	-	-	-
H MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING CONTROL SYSTEMS	-	-	-	-	-
I MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING SYSTEMS COMPONENTS	5	5	5	4	1
J MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING ELECTRICAL SYSTEMS	15	18	16	8	1
K INSTALLING AIR CONDITIONING, REFRIGERATION, AND HEATING SYSTEMS	6	7	7	5	1
L OPERATING AIR CONDITIONING AND REFRIGERATION PLANTS	10	13	10	5	1
M MAINTAINING EVAPORATIVE COOLERS, CONDENSERS, AND COOLING TOWERS	-	-	-	-	-
N MAINTAINING AIR COMPRESSOR SYSTEMS	1	1	1	-	-
O MAINTAINING AND OPERATING STEAM HEATING SYSTEMS	1	1	1	-	-
P MAINTAINING AND OPERATING HOT WATER HEATING SYSTEMS	24	26	26	15	-
Q MAINTAINING AND OPERATING HIGH TEMPERATURE HOT WATER HEATING SYSTEMS	9	11	10	6	-
R MAINTAINING FUEL AREAS	2	3	2	1	-
S TREATING AND TESTING WATER	2	2	3	2	-
T MAINTAINING AND SERVICING GAS DISTRIBUTION SYSTEMS	7	7	8	4	-
	2	2	2	1	-

TABLE 4
TASKS PERFORMED BY 75% OR MORE OF ALL 545X0 PERSONNEL

TASK	PERCENT MEMBERS PERFORMING
I13 INSPECT, CLEAN, OR REPLACE FILTERS	86
E7 INSPECT LOW AND HIGH SIDE PRESSURES ON AIR CONDITIONING SYSTEMS	85
I11 INSPECT, CLEAN, OR LUBRICATE MOTOR OR FAN BEARINGS	83
G10 INSPECT COMPRESSORS OR SYSTEM COMPONENTS FOR REFRIGERANT LEAKS	83
J5 INSPECT MOTORS	82
I7 INSPECT, ADJUST, OR ALIGN DRIVE BELTS	81
I24 PUMP DOWN, PURGE, OR EVACUATE UNITS OF REFRIGERATION OR AIR CONDITIONING SYSTEMS	81
F8 LOCATE OR REPAIR LEAKS ON REFRIGERATION SYSTEMS	80
J16 INSTALL FUSES	80
K33 MEASURE, CUT, OR FABRICATE COPPER TUBING	80
E18 PERFORM SEASONAL OR RECURRING MAINTENANCE ON AIR CONDITIONING SYSTEMS	79
J20 REMOVE OR INSTALL ELECTRIC MOTORS	79
J4 INSPECT FUSES OR CIRCUIT BREAKERS	79
I51 SILVER SOLDER LINES OR FITTINGS	79
I10 INSPECT, CLEAN, OR LUBRICATE BLOWER BEARINGS	78
C2 ANALYZE CAUSES OF REFRIGERATION OR AIR CONDITIONING SYSTEMS MALFUNCTIONS	77
I45 SERVICE FANS	77
E6 INSPECT AIR CONDITIONING SYSTEMS COMPONENTS FOR SECURITY OF MOUNTING	77
G1 CLEAN OR REPLACE COMPONENTS ON AIR COOLED CONDENSERS	76
J2 INSPECT ELECTRICAL CIRCUITS	76
F10 PERFORM SEASONAL OR RECURRING MAINTENANCE ON REFRIGERATION SYSTEMS	75
G2 CLEAN OR REPLACE COMPONENTS ON EVAPORATORS	75
I38 REMOVE OR INSTALL REFRIGERANT LINES	75

TABLE 5

TASKS WHICH BEST DIFFERENTIATE BETWEEN 3- AND 5-SKILL LEVEL 545X0 PERSONNEL
(PERCENT MEMBERS PERFORMING)

TASK	DAFSC 54530	DAFSC 54550	DIFFERENCE
I37 REMOVE OR INSTALL SOLENOID VALVES	48	73	-25
G22 REPLACE COMPONENTS ON THERMOSTATIC EXPANSION VALVES (TEV)	24	46	-22
H22 REMOVE OR INSTALL OIL SAFETY SWITCHES	35	57	-22
D5 CONDUCT ON-THE-JOB TRAINING (OJT)	8	30	-22
B15 ORIENT NEWLY ASSIGNED PERSONNEL	11	32	-21
D8 DEMONSTRATE OPERATION OF EQUIPMENT	11	32	-21
B26 SUPERVISE APPRENTICE REFRIGERATION AND AIR CONDITIONING SPECIALISTS (AFSC 54530)	5	26	-21
J19 ISOLATE MALFUNCTIONS IN ELECTRICAL SYSTEMS	50	70	-20
I34 REMOVE, INSTALL, OR ADJUST VALVE AND DAMPER LINKAGES	38	57	-19
H21 REMOVE OR INSTALL HUMIDISTATS	24	43	-19
J15 INSTALL CONTROL VOLTAGE TRANSFORMERS	25	43	-18
I27 REMOVE OR REPLACE CRANKCASE OIL HEATERS	39	57	-18
B3 COMPLETE AIRMAN PERFORMANCE REPORTS	3	21	-18
H4 CALIBRATE AND ADJUST OIL SAFETY SWITCHES	33	51	-18
J6 INSPECT MOTOR THERMAL OVERLOADS	47	65	-18
I1 ADJUST EVAPORATOR PRESSURE REGULATING (EPR) VALVES	22	40	-18
K23 INSTALL PACKAGE AIR CONDITIONING UNITS	20	38	-18

TABLE 6

TASKS WHICH BEST DIFFERENTIATE BETWEEN 5- AND 7-SKILL LEVEL 545X0 PERSONNEL
(PERCENT MEMBERS PERFORMING)

TASK	DAFSC 54550	DAFSC 54570	DIFFERENCE
B4 COUNSEL PERSONNEL ON MILITARY-RELATED PROBLEMS	19	79	-60
B3 COMPLETE AIRMAN PERFORMANCE REPORTS	21	76	-55
C12 EVALUATE PERFORMANCE OF SUBORDINATES	15	67	-52
B30 SUPERVISE REFRIGERATION AND AIR CONDITIONING SPECIALISTS (AFSC 54550)	19	71	-52
D6 COUNSEL INDIVIDUALS ON TRAINING PROGRESS	17	68	-51
D7 COUNSEL NEWLY ASSIGNED AIRMEN ON CAREER PROGRESSION OR EDUCATIONAL OPPORTUNITIES	15	65	-50
D3 BRIEF PERSONNEL ON CHANGES IN METHODS OR PROCEDURES	13	62	-49
D17 REVIEW PROGRESS OF INDIVIDUALS IN TRAINING	18	66	-48
A25 PLAN TRAINING PROGRAMS	13	59	-46
B23 SCHEDULE LEAVES OR PASSES	9	54	-45

TABLE 7

TASKS PERFORMED BY 65% OR MORE OF ALL 547X0 PERSONNEL

TASK	PERCENT MEMBERS PERFORMING
K35 MEASURE, CUT, OR THREAD PIPE	81
04 BLOW DOWN BOILERS OR WATER COLUMNS	76
015 INSPECT FOR PROPER WATER LEVEL IN BOILERS	75
111 INSPECT, CLEAN, OR LUBRICATE MOTOR OR FAN BEARINGS	74
125 REMOVE OR INSTALL CHECK VALVES	74
K33 MEASURE, CUT, OR FABRICATE COPPER TUBING	72
110 INSPECT, CLEAN, OR LUBRICATE BLOWER BEARINGS	70
048 REMOVE OR INSTALL STEAM HEATING SYSTEM VALVES OR FITTINGS	70
C1 ANALYZE CAUSES OF HEATING SYSTEMS MALFUNCTIONS	69
08 DRAIN BOILERS	69
K13 INSTALL OR MAINTAIN OIL BURNERS	68
113 INSPECT, CLEAN, OR REPLACE FILTERS	68
023 INSPECT OR PERFORM MAINTENANCE ON STEAM LINE TRAPS	68
026 INSPECT STEAM OR CONDENSATE LINES FOR LEAKS OR DETERIORATION	68
P8 INSTALL, MAINTAIN, OR PERFORM MAINTENANCE ON CIRCULATING PUMPS	68
012 INSPECT BOILER FEED AND CONDENSATE PUMPS	68
024 INSPECT OR REPLACE BOILER SAFETY VALVES	68
032 LIGHT-OFF BOILERS	67
05 CLEAN BOILER TUBES	67
P7 INSPECT OR REPLACE SAFETY RELIEF VALVES	67
J5 INSPECT MOTORS	66
06 CLEAN WATER COLUMN GAUGE GLASSES	66
J16 INSTALL FUSES	66
130 REMOVE, CLEAN, OR INSTALL SIGHT GLASSES	66
P3 FILL HOT WATER HEATING SYSTEMS WITH WATER AND BLEED AIR FROM SYSTEMS	65
K11 INSPECT OPERATION OF HEATING SAFETY DEVICES	65
I7 INSPECT, ADJUST, OR ALIGN DRIVE BELTS	65

TABLE 8

TASKS WHICH BEST DIFFERENTIATE BETWEEN 3- AND 5-SKILL LEVEL 547X0 PERSONNEL
(PERCENT MEMBERS PERFORMING)

	TASK	DAFSC 54730	DAFSC 54750	DIFFERENCE
041	PERFORM OPERATIONAL TESTS OF AUTOMATIC BOILER CONTROLS	19	47	-28
07	CONTROL STEAM OUTPUT OF BOILERS	28	55	-27
030	ISOLATE BOILER FLAME CONTROLS MALFUNCTIONS	20	47	-27
01	ADJUST FEED WATER UNITS IN STEAM HEATING SYSTEMS	35	62	-27
040	PERFORM CORRECTIVE ACTION IN CASE OF BOILER SAFETY SHUTDOWNS	28	54	-26
039	PERFORM COMBUSTION EFFICIENCY ANALYSES OR ADJUST FUEL AND AIR RATION ON STEAM HEATING SYSTEMS	20	46	-26
017	INSPECT OR CLEAN FIRE BOXES	42	67	-25
130	REMOVE, CLEAN, OR INSTALL SIGHT GLASSES	48	73	-25
016	INSPECT OR ADJUST AIR-FUEL RATION TO BOILERS	43	68	-25
013	INSPECT BOILER FEED MANHOLE AND HANDHOLE COVERS	45	69	-24
D5	CONDUCT ON-THE-JOB TRAINING (OJT)	7	31	-24
038	PERFORM BOILER PRE-OPERATIONAL CHECKS	35	58	-23
B25	SUPERVISE APPRENTICE HEATING SYSTEMS SPECIALISTS (AFSC 54730)	3	26	-23
047	REMOVE OR INSTALL BOILER MANHOLE OR HANDHOLE COVER GASKETS	45	68	-23

TABLE 9

TASKS WHICH BEST DIFFERENTIATE BETWEEN 5- AND 7-SKILL LEVEL 547X0 PERSONNEL
(PERCENT MEMBERS PERFORMING)

TASK	DAFSC 54750	DAFSC 54770	DIFFERENCE
B4 COUNSEL PERSONNEL ON MILITARY-RELATED PROBLEMS	18	83	-65
B28 SUPERVISE HEATING SYSTEMS SPECIALISTS (AFSC 54750)	18	78	-60
B18 PREPARE REQUISITIONS FOR EQUIPMENT OR SUPPLIES	16	74	-58
B23 SCHEDULE LEAVES OR PASSES	10	67	-57
B24 SCHEDULE WORK ASSIGNMENTS	13	70	-57
B3 COMPLETE AIRMAN PERFORMANCE REPORTS	19	76	-57
D6 COUNSEL INDIVIDUALS ON TRAINING PROGRESS	17	73	-56
C12 EVALUATE PERFORMANCE OF SUBORDINATES	15	69	-54
D3 BRIEF PERSONNEL ON CHANGES IN METHODS OR PROCEDURES	14	67	-53
B10 IMPLEMENT TRAINING PROGRAMS	12	65	-53
A25 PLAN TRAINING PROGRAMS	15	67	-52
D7 COUNSEL NEWLY ASSIGNED AIRMEN ON CAREER PROGRESSION OR EDUCATIONAL OPPORTUNITIES	16	67	-51
B15 ORIENT NEWLY ASSIGNED PERSONNEL	29	80	-51

TABLE 10

TASKS WHICH BEST DIFFERENTIATE BETWEEN DAFSC 54570 AND DAFSC 54790 PERSONNEL
(PERCENT MEMBERS PERFORMING)

	TASK	DAFSC 54570	DAFSC 54790	DIFFERENCE
G10	INSPECT COMPRESSORS OR SYSTEM COMPONENTS FOR REFRIGERANT LEAKS	74	3	+71
J9	INSPECT OR TEST MOTORS FOR CURRENT DRAW	72	4	+68
I51	SILVER SOLDER LINES OR FITTINGS	72	4	+68
E7	INSPECT LOW AND HIGH SIDE PRESSURES ON AIR CONDITIONING SYSTEMS	72	5	+67
I24	PUMP DOWN, PURGE, OR EVACUATE UNITS OF REFRIGERATION OR AIR CONDITIONING SYSTEMS	69	3	+66
J20	REMOVE OR INSTALL ELECTRIC MOTORS	69	3	+66
C6	EVALUATE CAPABILITY OF HEATING SYSTEMS SHOPS TO ACCOMPLISH ASSIGNED TASKS	5	68	-63
C16	INSPECT HEATING SYSTEMS SHOPS	5	67	-62
B29	SUPERVISE HEATING SYSTEMS TECHNICIANS (AFSC 54770)	4	58	-54
C1	ANALYZE CAUSES OF HEATING SYSTEMS MALFUNCTIONS	12	64	-52
A26	REVIEW REPORTS TO DETERMINE METHODS FOR IMPROVING PROCEDURES AT LOCAL ACTIVITIES	32	83	-50

TABLE 11

TASKS WHICH BEST DIFFERENTIATE BETWEEN DAFSC 54770 AND DAFSC 54790 PERSONNEL
(PERCENT MEMBERS PERFORMING)

	TASK	DAFSC 54770	DAFSC 54790	DIFFERENCE
012	INSPECT BOILER FEED AND CONDENSATE PUMPS	58	0	+58
K35	MEASURE, CUT, OR THREAD PIPE	61	4	+57
04	BLOW DOWN BOILERS OR WATER COLUMNS	57	0	+57
015	INSPECT FOR PROPER WATER LEVEL IN BOILERS	59	3	+56
016	INSPECT OR ADJUST AIR-FUEL RATION TO BOILERS	56	0	+56
K11	INSPECT OPERATION OF HEATING SAFETY DEVICES	59	5	+54
026	INSPECT STEAM OR CONDENSATE LINES FOR LEAKS OR DETERIORATION	57	4	+53
06	CLEAN WATER COLUMN GAUGE GLASSES	51	0	+51
017	INSPECT OR CLEAN FIRE BOXES	52	1	+51
032	LIGHT-OFF BOILERS	52	1	+51
B31	SUPERVISE REFRIGERATION AND AIR CONDITIONING TECHNICIANS (AFSC 54570)	3	73	-70
C17	INSPECT REFRIGERATION OR AIR CONDITIONING REPAIR SHOPS	8	71	-63
C2	ANALYZE CAUSES OR REFRIGERATION OR AIR CONDITIONING SYSTEMS MALFUNCTIONS	5	68	-63
C7	EVALUATE CAPABILITY OF REFRIGERATION AND AIR CONDITIONING SHOPS TO ACCOMPLISH ASSIGNED TASKS	8	70	-62
A26	REVIEW REPORTS TO DETERMINE METHODS FOR IMPROVING PROCEDURES AT LOCAL ACTIVITIES	36	82	-46
C14	EVALUATE SUGGESTIONS	41	84	-43
C18	PREPARE INSPECTION REPORTS	26	67	-41
A3	CONDUCT STAFF STUDIES	10	49	-39

ANALYSIS OF AFMS GROUPS

An analysis was also made comparing job differences among groups of individuals grouped by time in service. Very similar conclusions to those for DAFSC groups were noted in both career ladders.

Air Conditioning and Refrigeration Specialists (AFSC 545X0)

Table 12 reflects the time spent on duties by 545X0 personnel grouped by enlistment period. Throughout the first three enlistment periods, airmen spend a majority of their time maintaining and servicing refrigeration and air conditioning systems, servicing and overhauling major components, and maintaining control systems and electrical systems. Common tasks performed are those listed earlier in Table 4. At the fourth enlistment point, there is a noted increase in time spent on supervisory and administrative duties, with a corresponding drop in time spent on technical duties. Now, career ladder members are spending more of their time counseling personnel, evaluating performance of subordinates, reviewing progress of individuals in training, supervising 5-skill level specialists, and completing airman performance reports. However, these incumbents still spend over 60 percent of their job time performing technical tasks which involve maintenance of electrical systems and performance of routine and seasonal maintenance on air conditioning and refrigeration systems.

In looking at the job performance of first enlistment airmen (1-48 months AFMS), it was found that 155 tasks out of the 495 tasks in the job inventory were performed by 30 percent or more of the incumbents. The average number of tasks performed by each member was 115. Tables 13 and 14 present information as to the types of air conditioning and refrigeration systems maintained by these personnel, as well as equipment and special tools used.

Heating Systems Specialists (AFSC 547X0)

Table 15 shows the percent time spent on duties by the various enlistment groups in the 547X0 career ladder. As found in the 545X0 ladder, airmen in the first three enlistment groups spend most of their time on technical functions pertaining to the maintenance of steam and hot water heating systems and their electrical and mechanical components. It is during the fourth enlistment period that these incumbents also begin to spend a larger portion of their time on supervisory and administrative tasks. As with their 545X0 counterparts, these incumbents become more involved with writing airman performance reports, scheduling work assignments, counseling airmen, supervising 3- and 5-skill level subordinates, and directing the flow of work. Technical tasks still include boiler maintenance and routine maintenance on heating system components.

As for first enlistment job performance, 198 tasks were performed by 30 percent or more of these incumbents. This is slightly more than the 155 tasks found for 545X0 first-term incumbents. The average number of tasks performed by 547X0 first-termers is 97, as compared to 115 for 545X0 first-termers. Tables 16 and 17 show the types of heating systems maintained by 547X0 first enlistment personnel, as well as equipment and special tools used.

TABLE 12

PERCENT TIME SPENT ON DUTIES BY 545X0 AFMS GROUPS

DUTY	TOTAL MONTHS ACTIVE FEDERAL MILITARY SERVICE					
	1-48 (N=531)	49-96 (N=192)	97-144 (N=121)	145-192 (N=106)	193-240 (N=109)	240+ (N=20)
A ORGANIZING AND PLANNING	1	3	3	8	10	10
B DIRECTING AND IMPLEMENTING	1	4	0	11	15	15
C EVALUATING	2	3	4	6	7	7
D TRAINING	-	3	6	8	7	11
E MAINTAINING AND SERVICING AIR CONDITIONING SYSTEMS	10	10	9	7	7	6
F MAINTAINING AND SERVICING REFRIGERATION SYSTEMS	9	7	6	5	4	5
G SERVICING AND OVERHAULING MAJOR COMPONENTS OF REFRIGERATION AND AIR CONDITIONING SYSTEMS	11	10	9	7	7	6
H MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING CONTROL SYSTEMS	7	7	6	6	6	5
I MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING SYSTEMS COMPONENTS	23	21	18	14	13	14
J MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING ELECTRICAL SYSTEMS	12	12	12	10	8	8
K INSTALLING AIR CONDITIONING, REFRIGERATION, AND HEATING SYSTEMS	5	5	5	4	3	3
L OPERATING AIR CONDITIONING AND REFRIGERATION PLANTS	2	2	1	2	1	1
M MAINTAINING EVAPORATIVE COOLERS, CONDENSERS, AND COOLING TOWERS	7	6	6	3	4	5
N MAINTAINING AIR COMPRESSOR SYSTEMS	6	6	4	4	4	3
O MAINTAINING AND OPERATING STEAM HEATING SYSTEMS	1	-	1	1	1	-
P MAINTAINING AND OPERATING HOT WATER HEATING SYSTEMS	-	-	-	-	-	-
Q MAINTAINING AND OPERATING HIGH TEMPERATURE HOT WATER HEATING SYSTEMS	-	-	-	-	-	-
R MAINTAINING FUEL AREAS	-	-	-	-	-	-
S TREATING AND TESTING WATER	1	1	1	1	-	1
T MAINTAINING AND SERVICING GAS DISTRIBUTION SYSTEMS	-	-	-	-	-	-

TABLE 13

TYPES OF SYSTEMS MAINTAINED BY 30 PERCENT OR MORE
OF FIRST ENLISTMENT 545X0 INCUMBENTS

<u>SYSTEM</u>	<u>PERCENT MEMBERS PERFORMING</u>
WALK-IN REFRIGERATION BOXES	78
WINDOW AIR CONDITIONING UNITS	72
WATER COOLERS	72
ICE MAKERS	71
COMMERCIAL REFRIGERATION UNITS	68
CENTRAL AIR CONDITIONERS, 3 TONS AND BELOW	67
AIR COMPRESSORS (RPIE)	67
CENTRAL AIR CONDITIONERS, 4 TO 10 TONS	65
CENTRAL AIR CONDITIONERS, 11 TO 25 TONS	64
DOMESTIC REFRIGERATORS	64
MULTIPLE COMPRESSOR SYSTEMS	61
RECIPROCATING AIR CONDITIONING UNITS	59
CENTRAL AIR CONDITIONERS, 25 TONS AND ABOVE	59
MULTIPLE EVAPORATOR SYSTEMS	56
EVAPORATIVE COOLERS	50
VENTILATING EQUIPMENT	49
PORTABLE AIR COMPRESSORS	41
PORTABLE COOLING UNITS	38
HEAT PUMPS	36

TABLE 14

EQUIPMENT OR SPECIAL TOOLS USED OR OPERATED BY 30 PERCENT OR MORE
OF FIRST ENLISTMENT 545X0 INCUMBENTS

<u>EQUIPMENT OR SPECIAL TOOLS</u>	<u>PERCENT MEMBERS PERFORMING</u>
VACUUM PUMPS	90
SERVICE MANIFOLD GAUGES	88
HALIDE TESTERS	88
AMPROBES	82
*MULTIMETERS	81
*OXYGEN ACETYLENE WELDING EQUIPMENT	77
ELECTRONIC LEAK DETECTORS	56
*PRESTOLITE TORCH KITS	52
MANOMETERS	51
PNEUMATIC CONTROL TEST AND REPAIR KITS	40
ANEMOMETERS	40
VELOMETERS	36
*PIPE CUTTING AND THREADING EQUIPMENT	34
MICROMETERS	33

* Also Used or Operated By 30 Percent or More of 547X0 Incumbents

TABLE 15

PERCENT TIME SPENT ON DUTIES BY 547XO AFMS GROUPS

DUTY	TOTAL MONTHS ACTIVE FEDERAL MILITARY SERVICE					
	1-48 (N=587)	49-96 (N=166)	97-144 (N=103)	145-192 (N=91)	193-240 (N=95)	240+ (N=64)
A ORGANIZING AND PLANNING	1	2	5	10	14	22
B DIRECTING AND IMPLEMENTING	1	4	9	16	22	29
C EVALUATING	2	3	4	7	11	20
D TRAINING	1	4	6	8	8	9
E MAINTAINING AND SERVICING AIR CONDITIONING SYSTEMS	1	-	-	1	1	1
F MAINTAINING AND SERVICING REFRIGERATION SYSTEMS	-	-	-	-	-	-
G SERVICING AND OVERHAULING MAJOR COMPONENTS OF REFRIGERATION AND AIR CONDITIONING SYSTEMS	-	-	-	-	-	-
H MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING CONTROL SYSTEMS	5	4	5	4	4	1
I MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING SYSTEMS COMPONENTS	17	14	12	10	6	3
J MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING ELECTRICAL SYSTEMS	7	6	6	6	4	2
K INSTALLING AIR CONDITIONING, REFRIGERATION, AND HEATING SYSTEMS	11	9	8	6	4	2
L OPERATING AIR CONDITIONING AND REFRIGERATION PLANTS	-	-	-	-	-	-
M MAINTAINING EVAPORATIVE COOLERS, CONDENSERS, AND COOLING TOWERS	1	-	-	1	-	-
N MAINTAINING AIR COMPRESSOR SYSTEMS	1	1	1	1	1	-
O MAINTAINING AND OPERATING STEAM HEATING SYSTEMS	26	28	22	16	13	9
P MAINTAINING AND OPERATING HOT WATER HEATING SYSTEMS	10	9	9	7	4	2
Q MAINTAINING AND OPERATING HIGH TEMPERATURE HOT WATER HEATING SYSTEMS	3	2	1	2	1	-
R MAINTAINING FUEL AREAS	2	2	3	2	2	1
S TREATING AND TESTING WATER	8	9	6	4	4	1
T MAINTAINING AND SERVICING GAS DISTRIBUTION SYSTEMS	2	2	1	1	1	-

TABLE 16

TYPES OF SYSTEMS MAINTAINED BY 30 PERCENT OR MORE
OF FIRST ENLISTMENT 547X0 INCUMBENTS

SYSTEM	PERCENT MEMBERS PERFORMING
LOW PRESSURE STEAM HEATING SYSTEMS	79
FORCED WARM AIR HEATING SYSTEMS	78
UNIT HEATERS	75
LOW TEMPERATURE HOT WATER HEATING SYSTEMS	75
OIL FIRED EQUIPMENT	72
SPACE HEATERS	72
HIGH PRESSURE STEAM HEATING SYSTEMS	62
DOMESTIC WATER HEATERS	61
HIGH TEMPERATURE HOT WATER HEATING SYSTEMS	55
HEAT PUMPS	50
DOMESTIC GAS COOK STOVES	39
GENERATORS (RPIE BOILERS)	31

TABLE 17

EQUIPMENT OR SPECIAL TOOLS USED OR OPERATED BY 30 PERCENT OR MORE
OF FIRST ENLISTMENT 547X0 INCUMBENTS

EQUIPMENT OR SPECIAL TOOLS	PERCENT MEMBERS PERFORMING
* PIPE CUTTING AND THREADING EQUIPMENT	87
TUBE AND FLUE CLEANERS	57
FLUE GAS ANALYZERS	51
STACK THERMOMETERS	49
* MULTIMETERS	42
DRAFT GAUGES	39
* PRESTOLITE TORCH KITS	37
STEAM FLOW METERS	36
WATER FLOW METERS	34
GAS FLOW METERS	33
* OXYGEN ACETYLENE WELDING EQUIPMENT	32
WATER ANALYZERS	30
OVEN THERMOSTAT CALIBRATION THERMOMETERS	30

* Also Used or Operated By 30 Percent or More of 545X0 Incumbents

ANALYSIS OF CONUS/OVERSEAS DIFFERENCES

An analysis of task performance differences between 5-skill level incumbents stationed within the CONUS and those stationed overseas was made for both the 545X0 and 547X0 career ladders. In general, very little difference was found between the two groups in both career ladders.

Table 18 lists those tasks which best differentiate between 545X0 CONUS and overseas incumbents. Tasks showing higher percentages of CONUS personnel performing are mostly from the duty area dealing with maintaining evaporative coolers, condensers, and cooling towers (Duty M). Other tasks reflecting higher percentages for CONUS personnel were those dealing with pneumatic control systems. As for tasks showing higher percentages of overseas members performing, most are related to the maintaining of refrigeration and air conditioning electrical systems (Duty J). Generally, these differences in percent members performing are considered small.

Table 19 lists those tasks showing the largest differences in percent members performing for the CONUS and overseas groups in the 547X0 career ladder. In general, both groups were found to be performing similar tasks, with differences in percent members performing generally less than 10 percent. As reflected in Table 19, tasks dealing with maintaining and servicing gas distribution systems generally showed larger differences than other duty areas. In addition, very few tasks were found to be performed by a higher percentage of overseas incumbents.

TABLE 18

TASKS WHICH BEST DIFFERENTIATE BETWEEN CONUS AND OVERSEAS PERSONNEL HOLDING DAFSC 54550
(PERCENT MEMBERS PERFORMING)

TASK	CONUS (N=584)	OVERSEAS (N=133)	DIFFERENCE
M2 CLEAN OR PAINT COOLING TOWERS	70	39	+31
H16 REMOVE OR INSTALL COMPONENTS OF PNEUMATIC CONTROL SYSTEMS	54	30	+24
M19 REMOVE OR INSTALL COOLING TOWERS	32	9	+23
M14 PREPARE COOLING TOWERS OR EVAPORATIVE CONDENSERS FOR WINTER OPERATION	47	26	+21
H5 CALIBRATE AND ADJUST PNEUMATIC CONTROL SYSTEM COMPONENTS	58	38	+20
M4 INSPECT OR ADJUST BLEED OFF	53	33	+20
H12 ISOLATE MALFUNCTIONS ON PNEUMATIC CONTROL SYSTEMS	54	35	+19
M1 ADJUST WATER DISTRIBUTION ON COOLING TOWERS	51	32	+19
M5 INSPECT OR ADJUST WATER LEVEL FLOAT VALVES	60	42	+18
M21 REMOVE OR REPLACE WATER LEVEL FLOAT VALVES	48	32	+16
K39 SELECT POSITION FOR REFRIGERATION COMPONENTS	30	44	-14
J7 INSPECT OR TEST CONTROL VOLTAGE TRANSFORMERS	47	60	-13
J19 ISOLATE MALFUNCTIONS IN ELECTRICAL SYSTEMS	68	80	-12
J8 INSPECT OR TEST ELECTRICAL POWER SUPPLIES	66	78	-12
J2 INSPECT ELECTRICAL CIRCUITS	77	89	-12
J6 INSPECT MOTOR THERMAL OVERLOADS	63	74	-11
I49 SERVICE, REFILL, OR REPLACE DEHYDRATORS	33	44	-11
K5 ASSEMBLE SECTIONAL WALK-IN REFRIGERATORS	15	26	-11

TABLE 19

TASKS WHICH BEST DIFFERENTIATE BETWEEN CONUS AND OVERSEAS PERSONNEL HOLDING DAFSC 54750
(PERCENT MEMBERS PERFORMING)

	TASK	CONUS (N=586)	OVERSEAS (N=140)	DIFFERENCE
K12	INSTALL OR MAINTAIN GAS BURNERS	69	23	+46
T2	INSPECT GAS DISTRIBUTION LINES FOR LEAKAGES	47	18	+29
T9	INSTALL GAS REGULATORS	39	14	+25
T8	INSTALL GAS DISTRIBUTION LINES	30	12	+18
H16	REMOVE OR INSTALL COMPONENTS OF PNEUMATIC CONTROL SYSTEMS	32	15	+17
K14	INSTALL AUTOMATIC HEATER CONTROLS OR THERMOSTATS	69	53	+16

ANALYSIS OF TASK DIFFICULTY

From a listing of airmen identified for the 545X0/547X0 job survey, 100 incumbents in the 7- and 9-skill levels from various commands and locations were selected to rate task difficulty. Tasks were rated on a nine-point scale from extremely low to extremely high difficulty, with difficulty defined as the length of time it takes an average incumbent to learn to do the task. Interrater agreement among the 58 raters who returned booklets was .94. Rating were adjusted so that tasks of average difficulty have ratings of 5.00.

Of the 495 tasks in the inventory booklet, 244 were rated above average in difficulty. Twenty-one of these 244 tasks were performed by 55 percent or more of the 545X0 respondents, while only 10 tasks were performed by 50 percent or more the 547X0 respondents. (See Tables 20 and 21). In general, tasks rated as difficult deal with maintaining and servicing air conditioning systems and maintaining refrigeration, air conditioning, and heating control systems. In addition, tasks related to assembling refrigeration equipment, operating air conditioning and refrigeration plants, and maintaining and operating high temperature hot water heating systems were also rated above average.

Of the 251 tasks rated as less than average in difficulty, 22 were performed by 75 percent or more of 545X0 personnel, while 23 were performed by 65 percent or more of the 547X0 respondents (see Tables 22 and 23). Basically, low difficulty tasks involved maintaining system components such as drive belts, blower bearings, motor or fan bearings, filters, and fans; maintaining evaporative coolers, condensers, and cooling towers; maintaining air compressor systems; maintaining and operating steam and hot water heating systems; and treating and testing water. In general, most air conditioning and refrigeration tasks are rated as somewhat more difficult than most heating system tasks.

TABLE 20

TASKS RATED ABOVE AVERAGE IN DIFFICULTY WHICH ARE PERFORMED BY
55 PERCENT OR MORE OF DAFSC 545XO RESPONDENTS

TASK	DIFFICULTY INDEX	PERCENT MEMBERS PERFORMING
H10 ISOLATE MALFUNCTIONS ON ELECTRICAL CONTROL SYSTEMS	6.90	59
C2 ANALYZE CAUSES OF REFRIGERATION OR AIR CONDITIONING SYSTEMS MALFUNCTIONS	6.74	77
J19 ISOLATE MALFUNCTIONS IN ELECTRICAL SYSTEMS	6.59	66
G4 INSPECT, ADJUST, OR REPLACE CAPACITY CONTROLS	6.14	63
H8 INSPECT OPERATION OF OR ADJUST SAFETY CONTROL SYSTEMS	6.14	58
H18 REMOVE OR INSTALL ELECTRICAL CONTROL SYSTEM COMPONENTS	6.09	56
J2 INSPECT ELECTRICAL CIRCUITS	6.00	76
G8 INSPECT OR ADJUST THERMOSTATIC EXPANSION VALVES (TEV)	5.98	65
E12 INSPECT OR ADJUST RECIPROCATING COMPRESSION AIR CONDITIONING SYSTEMS	5.96	63
H1 CALIBRATE AND ADJUST ELECTRICAL THERMOSTATS OR PRESSURE SWITCHES	5.81	66
E23 REMOVE OR INSTALL RECIPROCATING COMPRESSION AIR CONDITIONING SYSTEMS COMPONENTS	5.81	59
J14 INSTALL CONTROL RELAYS OR COMPONENTS	5.62	61
F4 CLEAN, SERVICE, OR ADJUST ICE MAKING MACHINES	5.48	62
F13 SERVICE OR PERFORM MAINTENANCE ON AUTOMATIC DEFROST SYSTEMS	5.44	56
J11 INSTALL RUNNING OR STARTING WINDINGS OF MOTORS	5.35	55
H19 REMOVE OR INSTALL ELECTRICAL WIRING ON CONTROLS	5.31	69
H24 REMOVE OR INSTALL RELAYS	6.26	71
E1 ANALYZE PRESSURE OR TEMPERATURE READINGS	5.20	71
F12 REMOVE OR INSTALL COMPONENTS ON ICE MAKING MACHINES	5.15	58
I50 SILVER BRAZE LINES OR FITTINGS	5.10	61
J6 INSPECT MOTOR THERMAL OVERLOADS	5.06	61

TABLE 21

TASKS RATED ABOVE AVERAGE IN DIFFICULTY WHICH ARE PERFORMED BY
50 PERCENT OR MORE OF DAFSC 547XO RESPONDENTS

	TASK	DIFFICULTY INDEX	PERCENT MEMBERS PERFORMING
K7	BALANCE HEATING SYSTEMS	6.59	51
H1	CALIBRATE AND ADJUST ELECTRICAL THERMOSTATS OR PRESSURE SWITCHES	5.81	50
C1	ANALYZE CAUSES OF HEATING SYSTEMS MALFUNCTIONS	5.79	69
H19	REMOVE OR INSTALL ELECTRICAL WIRING ON CONTROLS	5.31	50
K11	INSPECT OPERATION OF HEATING SAFETY DEVICES	5.24	65
O16	INSPECT OR ADJUST AIR-FUEL RATION TO BOILERS	5.24	62
K13	INSTALL OR MAINTAIN OIL BURNERS	5.16	68
P9	ISOLATE ONE OR TWO PIPE HOT WATER SYSTEMS MALFUNCTIONS	5.14	51
K14	INSTALL AUTOMATIC HEATER CONTROLS OR THERMOSTATS	5.02	64
I42	REMOVE OR INSTALL BURNERS IN FORCED AIR HEATING SYSTEMS	5.00	59

TABLE 22

TASKS RATED BELOW AVERAGE IN DIFFICULTY WHICH ARE PERFORMED BY
75 PERCENT OR MORE OF DAFSC 545XO RESPONDENTS

TASK	DIFFICULTY INDEX	PERCENT MEMBERS PERFORMING
I24 PUMP DOWN, PURGE, OR EVACUATE UNITS OF REFRIGERATION OR AIR CONDITIONING SYSTEMS	4.96	81
I51 SILVER SOLDER LINES OR FITTINGS	4.96	79
I38 REMOVE OR INSTALL REFRIGERANT LINES	4.74	75
E18 PERFORM SEASONAL OR RECURRING MAINTENANCE ON AIR CONDITIONING SYSTEMS	4.73	78
J20 REMOVE OR INSTALL ELECTRIC MOTORS	4.56	79
J4 INSPECT FUSES OR CIRCUIT BREAKERS	4.53	79
J5 INSPECT MOTORS	4.52	82
F10 PERFORM SEASONAL OR RECURRING MAINTENANCE ON REFRIGERATION SYSTEMS	4.50	75
F8 LOCATE OR REPAIR LEAKS ON REFRIGERATION SYSTEMS	4.49	80
G2 CLEAN OR REPLACE COMPONENTS ON EVAPORATORS	4.39	75
E7 INSPECT LOW AND HIGH SIDE PRESSURES ON AIR CONDITIONING SYSTEMS	4.31	85
I23 REMOVE OR REPLACE FANS	3.92	76
I45 SERVICE FANS	3.88	76
K33 MEASURE, CUT, OR FABRICATE COPPER TUBING	3.85	80
G1 CLEAN OR REPLACE COMPONENTS ON AIR COOLED CONDENSERS	3.60	76
C10 INSPECT COMPRESSORS OR SYSTEM COMPONENTS FOR REFRIGERANT LEAKS	3.54	84
I7 INSPECT, ADJUST, OR ALIGN DRIVE BELTS	3.50	81
J16 INSTALL FUSES	3.46	80
I10 INSPECT, CLEAN, OR LUBRICATE BLOWER BEARINGS	3.24	78
I11 INSPECT, CLEAN, OR LUBRICATE MOTOR OR FAN BEARINGS	2.99	83
E6 INSPECT AIR CONDITIONING SYSTEMS COMPONENTS FOR SECURITY OF MOUNTING	2.84	77
I13 INSPECT, CLEAN, OR REPLACE FILTERS	2.38	86

TABLE 23

TASKS RATED BELOW AVERAGE IN DIFFICULTY WHICH ARE PERFORMED BY
65 PERCENT OR MORE OF DAFSC 547X0 RESPONDENTS

TASK	DIFFICULTY INDEX	PERCENT MEMBERS PERFORMING
032 LIGHT-OFF BOILERS	4.93	67
024 INSPECT OR REPLACE BOILER SAFETY VALVES	4.90	68
012 INSPECT BOILER FEED AND CONDENSATE PUMPS	4.61	68
P8 INSTALL, MAINTAIN, OR PERFORM MAINTENANCE ON CIRCULATING PUMPS	4.61	68
J5 INSPECT MOTORS	4.52	66
023 INSPECT OR PERFORM MAINTENANCE ON STEAM LINE TRAPS	4.30	68
048 REMOVE OR INSTALL STEAM HEATING SYSTEM VALVES OR FITTINGS	4.20	70
P7 INSPECT OR REPLACE SAFETY RELIEF VALVES	4.14	67
K35 MEASURE, CUT, OR THREAD PIPE	4.03	81
I25 REMOVE OR INSTALL CHECK VALVES	3.92	74
05 CLEAN BOILER TUBES	3.92	67
K33 MEASURE, CUT, OR FABRICATE COPPER TUBING	3.85	72
I30 REMOVE, CLEAN, OR INSTALL SIGHT GLASSES	3.76	66
026 INSPECT STEAM OR CONDENSATE LINES FOR LEAKS OR DETERIORATION	3.64	68
I7 INSPECT, ADJUST, OR ALIGN DRIVE BELTS	3.50	65
J16 INSTALL FUSES	3.46	66
04 BLOW DOWN BOILERS OR WATER COLUMNS	3.34	76
I10 INSPECT, CLEAN, OR LUBRICATE BLOWER BEARINGS	3.24	70
08 DRAIN BOILERS	3.16	69
015 INSPECT FOR PROPER WATER LEVEL IN BOILERS	3.14	75
06 CLEAN WATER COLUMN GAUGE GLASSES	3.10	66
I11 INSPECT, CLEAN, OR LUBRICATE MOTOR OR FAN BEARINGS	2.99	74
I13 INSPECT, CLEAN, OR REPLACE FILTERS	2.38	68

COMPARISON OF REFRIGERATION AND AIR CONDITIONING SYSTEMS (AFSC 545X0)
AND HEATING SYSTEMS (AFSC 547X0) CAREER LADDERS

An analysis of the similarities and differences between the 545X0 and 547X0 career ladders was made. Table 24 lists the 32 tasks performed by 40 percent or more of personnel in both career ladders. Most of the tasks listed pertain to maintaining refrigeration, air conditioning, and heating systems components such as filters, blowers, motors, fans, valves, and ducting, as well as maintaining electrical systems. Generally, the tasks listed appear to require common knowledges of mechanical and electrical equipment, regardless of system specialization.

Equipment similarities and differences between the two career ladders were reflected earlier in Tables 13, 14, 16, and 17 of the ANALYSIS OF AFMS GROUPS section of this report. While the percentages presented in the tables are for first-term airmen, they follow almost exactly the percentages found for the overall career ladder samples. Basically, airmen in each career ladder work with equipment specifically used with either refrigeration and air conditioning systems or with heating systems. Thus, equipment commonality between the two career ladders is low, with very few items of equipment being used by more than 30 percent of the incumbents in both career ladders. However, personnel in both career ladders are maintaining common components of these systems such as filters, motors, fans, bearings, and electrical controls.

TABLE 24

TASKS PERFORMED BY 40% OR MORE INCUMBENTS IN BOTH 545X0 AND 547X0 CAREER LADDERS
(PERCENT MEMBERS RESPONDING)

TASK	545X0	547X0
I13 INSPECT, CLEAN, OR REPLACE FILTERS	86	68
I11 INSPECT, CLEAN, OR LUBRICATE MOTOR OR FAN BEARINGS	83	74
I7 INSPECT, ADJUST, OR ALIGN DRIVE BOLTS	81	65
J5 INSPECT MOTORS	82	66
I10 INSPECT, CLEAN, OR LUBRICATE BLOWER BEARINGS	78	70
I45 SERVICE FANS	77	51
J20 REMOVE OR INSTALL ELECTRIC MOTORS	79	62
J4 INSPECT FUSES OR CIRCUIT BREAKERS	79	61
J16 INSTALL FUSES	80	66
K33 MEASURE, CUT, OR FABRICATE COPPER TUBING	80	72
I28 REMOVE OR REPLACE FANS	76	59
I3 ALIGN, ADJUST, OR INSTALL COUPLINGS OR PULLEYS	73	62
J24 WIRE-IN MOTORS TO POWER SOURCES	70	54
H19 REMOVE OR INSTALL ELECTRICAL WIRING ON CONTROLS	69	50
I8 INSPECT OR ADJUST DAMPERS	69	62
I9 INSPECT OR CLEAN DUCTS	66	52
I5 CALIBRATE OR INSTALL GAUGES	70	54
H1 CALIBRATE AND ADJUST ELECTRICAL THERMOSTATS OR PRESSURE SWITCHES	66	50
I37 REMOVE OR INSTALL SOLENOID VALVES	67	55
I14 INSPECT OPERATION OF CENTRIFUGAL WATER PUMPS	55	60
I40 REMOVE OR INSTALL INSULATING MATERIALS ON DUCTS AND PIPES	58	62
H8 INSPECT OPERATION OF OR ADJUST SAFETY CONTROL SYSTEMS	58	49
H24 REMOVE OR INSTALL RELAYS	71	47
I25 REMOVE OR INSTALL CHECK VALVES	46	74
I30 REMOVE, CLEAN, OR INSTALL SIGHT GLASSES	65	66
I32 REMOVE, INSTALL, OR ADJUST PACKING ON CENTRIFUGAL WATER PUMPS	42	57
I33 REMOVE, INSTALL, OR ADJUST WATER REGULATING VALVES	40	51
I34 REMOVE, INSTALL, OR ADJUST VALVES AND DAMPER LINKAGES	53	42
I35 REMOVE OR INSTALL CENTRIFUGAL WATER PUMPS	42	57
I44 SERVICE AIR HANDLING UNITS	73	47
J2 INSPECT ELECTRICAL CIRCUITS	76	44
J15 INSTALL CONTROL VOLTAGE TRANSFORMERS	42	40

COMPARISON OF AFM 39-1 JOB DESCRIPTIONS TO SURVEY DATA

Survey results were compared to the AFM 39-1 job descriptions for both the 545X0 and 547X0 career ladders. The job descriptions for Refrigeration and Air Conditioning personnel, AFSC 545X0, cover tasks pertaining to the installation, maintenance, modification, servicing, and repair of refrigeration, air conditioning, evaporative cooling, air compressing, and ventilation equipment, plants, and systems, including portable units (other than AGE). The job descriptions for the Heating Systems incumbents, AFSC 547X0, cover tasks relating to the installation, maintenance, repair, and operation of heating plants, systems, and equipment.

Overall, these descriptions generally reflect an accurate picture of the jobs performed by personnel in each career ladder. Analysis of the survey data shows adequate percentages of personnel in both ladders performing tasks relating to these functions.

COMPARISON OF 545X0 SPECIALTY TRAINING STANDARD (STS) WITH SURVEY DATA

A comprehensive review of tentative STS 545X0, dated 1 December 1976, was made by comparing STS items to survey data for the 545X0 respondents. STS paragraphs 1, 3, 4, 5, 6, 7, and 8 were not evaluated since they contain information generally applicable across most career ladders. Paragraphs 12 and 13 were also not evaluated since they were primarily concerned with knowledge levels rather than task performance levels. In the remaining paragraphs, only those items showing task performance levels were evaluated.

In a general sense, the tentative 545X0 STS covers the major aspects of the Refrigeration and Air Conditioning career ladder. This includes the maintenance of refrigeration components such as compressors, condensers, evaporators, and air compressing equipment; refrigeration systems; refrigeration and air conditioning controls; multiple refrigeration systems; commercial refrigeration; air conditioning equipment and components such as fans and filters; absorption air conditioning systems; cooling towers and evaporative condensers; and water pumps; as well as water conditioning functions. Survey results reflected adequate percentages of 545X0 respondents performing tasks related to all the above functions.

However, some inadequacies were noted in the task statements listed under many of the STS paragraphs. Some tasks being performed by a fairly high percentage of the respondents were not listed, primarily supervision and training tasks that would be included in paragraph 2 of the STS. Supervision tasks not listed include counsel personnel on military-related problems, direct flow of work, and report work stoppages. Training tasks not listed include implement training programs, plan training programs, and counsel individuals on training progress. In addition, several key administrative tasks were not found in the STS. These included prepare requisitions for equipment or supplies and prepare work order requests.

In addition to the above mentioned omitted tasks, the listing of task statements under each STS paragraph seemed confusing and at times repetitious. The clear and concise listing of task statements as seen in the 547X0 STS was not found. Therefore, a further review of all existing task statements by appropriate training personnel against the survey data seems appropriate. This would allow for better clarity in several of the STS paragraphs and would remove some of the seemingly repetition in the listing of responsibilities and tasks.

COMPARISON OF 547X0 SPECIALTY TRAINING STANDARD (STS)
WITH SURVEY RESULTS

A comprehensive review of STS 547X0, dated July 1976, was made by comparing STS items to survey data. Paragraphs one through three were not evaluated since they contain general information which is applicable across most career ladders.

All paragraphs evaluated were well supported by the survey data. However, a number of inventory tasks performed by a large percentage of survey respondents were not directly covered in several of the STS paragraphs. These tasks are listed in Table 25, along with the percent members performing them. In addition, the area covering the maintenance and servicing of gas distribution systems was completely omitted from the STS. Several key tasks from this area being performed by a fairly substantial number of 547X0 respondents are also listed at the end of Table 25. Inclusion of these tasks as well as the other tasks listed in the table should be considered during the next scheduled review of the 547X0 STS.

TABLE 25

PROPOSED ADDITIONS TO 547X0 SPECIALTY TRAINING STANDARD (STS)

STS PARAGRAPH	SUBJECT	PROPOSED ADDITION	PERCENT MEMBERS PERFORMING			
			TOTAL SAMPLE (N=1,034)	DAFSC 54730 (N=141)	DAFSC 54750 (N=727)	DAFSC 54770 (N=166)
6	MAINTAINING FUEL AREAS AND FUEL SYSTEMS	VERIFY QUANTITY OF FUEL OIL IN TANKS	44	35	45	45
		INSPECT GAS OR OIL FUEL LINES OR FITTINGS	58	45	61	52
		INSPECT OIL TANKS FOR WATER OR OTHER IMPURITIES	39	21	41	45
		INSPECT OR PERFORM PREVENTIVE MAINTENANCE ON OIL STORAGE TANKS	24	12	25	30
8	INSTALLING HEATING SYSTEMS	BALANCE HEATING SYSTEMS	51	42	54	48
		INSTALL HEAT PUMPS	30	41	32	13
9	MAINTAINING HEATING CONTROL SYSTEMS AND ELECTRICAL SYSTEMS	CALIBRATE AND ADJUST ELECTRONIC CONTROLS	25	14	26	33
		CALIBRATE MOTORIZED ELECTRICALLY OPERATED VALVES	34	25	35	36
		REMOVE OR INSTALL OIL SAFETY SWITCHES	24	18	25	25
		REMOVE OR INSTALL COMPONENTS OF SAFETY CONTROL SYSTEMS	38	28	40	39
		INSPECT, ADJUST, OR INSTALL TIMERS OR TIMER COMPONENTS	24	15	25	28
		INSPECT MOTORS	66	62	69	57
		INSPECT OR TEST MOTORS FOR CURRENT DRAW	23	18	24	25
		REVERSE MOTORS	29	25	29	28
		ISOLATE MALFUNCTIONS IN ELECTRICAL SYSTEMS	34	27	36	32

TABLE 25 (CONTINUED)
 PROPOSED ADDITIONS TO 547X0 SPECIALTY TRAINING STANDARD (STS)

STS PARAGRAPH	SUBJECT	PROPOSED ADDITION	PERCENT MEMBERS PERFORMING			
			TOTAL SAMPLE (N=1,034)	DAFSC 54730 (N=141)	DAFSC 54750 (N=727)	DAFSC 54770 (N=166)
10	MAINTAINING WARM AIR HEATING SYSTEMS AND COMPONENTS	INSPECT, CLEAN, OR LUBRICATE BLOWER BEARINGS SERVICE FANS	70	56	75	57
			51	45	55	39
11	MAINTAINING AND OPERATING HOT WATER HEATING SYSTEMS	ISOLATE ONE OR TWO PIPE HOT WATER SYSTEMS MALFUNCTIONS	51	43	53	45
		REMOVE OR INSTALL HOT WATER DISTRIBUTION LINES	53	45	57	42
		REMOVE OR INSTALL AIR BLEED VALVES	55	48	58	46
		ADJUST STEAM REGULATING VALVES	56	48	60	47
13	MAINTAINING STEAM HEATING SYSTEMS	BLEED STEAM SYSTEMS	58	52	63	41
		CLEAN BOILER TUBES	67	59	74	44
		INSPECT BOILER FEED AND CONDENSATE PUMPS	68	54	73	58
		INSPECT OR CLEAN FIRE BOXES	61	42	67	52
		LAY AWAY BOILERS	32	16	35	31
		OBSERVE OR ADJUST BOILER AIR FLOW SWITCHES	29	21	31	23
		TEST BOILER WATER FOR DISSOLVED OXYGEN	26	17	30	19
15	TREATING AND TESTING WATER	REMOVE OR INSTALL CHEMICAL FEEDING EQUIPMENT	27	14	29	30
		MIX CHEMICALS REQUIRED TO TREAT WATER	43	30	45	36

TABLE 25 (CONTINUED)
 PROPOSED ADDITIONS TO 547XO SPECIALTY TRAINING STANDARD (STS)

STS PARAGRAPH	SUBJECT	PROPOSED ADDITION	PERCENT MEMBERS PERFORMING			
			TOTAL SAMPLE (N=1,034)	DAFSC 54730 (N=141)	DAFSC 54750 (N=727)	DAFSC 54770 (N=166)
--	MAINTAINING AND SERVICING GAS DISTRIBUTION SYSTEMS	INSPECT GAS DISTRIBUTION LINES FOR LEAKAGES	37	33	41	24
		INSPECT GAS DISTRIBUTION LINES FOR PRESSURE DROPS	16	14	18	11
		INSPECT OR PERFORM MAINTENANCE ON INCOMING GAS REGULATORS	21	16	24	13
		INSTALL GAS DISTRIBUTION LINES	23	21	27	10
		INSTALL GAS REGULATORS	31	29	35	17
		PERFORM OPERATIONAL INSPECTIONS OF GAS PRESSURE REGULATORS	18	12	20	13
		REMOVE OR INSTALL GAS DISTRIBUTION SYSTEMS	19	13	22	12

SUMMARY OF BACKGROUND INFORMATION

Assignment To Career Ladder

Sixty percent of the 545X0 incumbents completed resident technical training, with the second largest group retraining into the career ladder from another AFS (11 percent). The 547X0 incumbents primarily entered the career ladder by directed duty assignment (DDA) from basic training without a bypass test (35 percent) or completed resident technical training (33 percent). Other personnel in both career ladders were assigned to the field by the various other methods listed in Table 26.

Relative Job Satisfaction

Percentages of the total sample and enlistment groups for both ladders responding to the various points of the job interest and perceived utilization of talents and training are presented in Tables 27 and 28. Seventy-one percent of all 545X0 incumbents and 72 percent of all 547X0 incumbents indicated that their job was interesting. This is somewhat lower than the 80 percent (average) for incumbents in 23 other career ladders which were studied in 1976.

Incumbents in both career ladders also indicated the degree to which they felt their talents and training were being used in their job. Seventy-eight percent of the 545X0 incumbents felt their talents were being utilized fairly well or better, while 76 percent expressed similar feelings in regards to their training. As for 547X0 incumbents, 78 percent found their talents being utilized effectively, while 80 percent felt their training was being used fairly well or better. These responses are slightly lower than the 85 percent (average) figure indicated by respondents in the 22 other career ladders surveyed in 1976.

Reenlistment Intentions

The expressed intentions toward reenlistment among survey respondents in both career ladders are detailed in Table 29. First-term airmen in both the 545X0 and 547X0 career ladders tended to indicate negative feelings toward reenlisting, with approximately 50-51 percent of these incumbents indicating "no" or "probably no." It is also interesting to note that an even larger percentage of second term and career airmen in the 545X0 ladder (57 and 65 percent, respectively) expressed negative feelings about reenlisting.

Actual reenlistment rates for the first nine months of FY 77 are given in Table 30. Reenlistment intentions of first-term airmen in both career ladders closely matched the actual reenlistment rates. The actual reenlistment rates for 545X0 second term and career airmen were much higher than the intentions expressed by the survey respondents.

TABLE 26

METHOD OF ASSIGNMENT TO CAREER FIELD
(PERCENT MEMBERS RESPONDING)

ASSIGNMENT	DAFSC 545X0	DAFSC 547X0	DAFSC 54790
COMPLETED RESIDENT TECHNICAL TRAINING	60	33	20
RECLASSIFIED WITHOUT TECHNICAL TRAINING OR OJT	-	2	4
DIRECTED DUTY ASSIGNMENT (DDA) FROM BASIC TRAINING TO OJT WITHOUT BYPASS TEST	3	35	14
DDA FROM BASIC TRAINING BY BYPASS TEST	6	1	3
CONVERTED FROM ANOTHER AFS WITHOUT TRAINING	1	3	6
RETRAINED FROM ANOTHER AFS	11	8	25
REENLISTED AFTER PRIOR SERVICE IN USAF OR OTHER BRANCH OF SERVICE	3	1	4
NOT ASSIGNED BY ANY OF ABOVE	8	6	6
NO REPLY	8	11	18

EXPRESSIONS OF JOB INTEREST AND PERCEIVED UTILIZATION OF TALENTS AND TRAINING, BY DAFSC 545X0
TOTAL SAMPLE AND AFMS GROUPS
(PERCENT MEMBERS RESPONDING)

RESPONSE	TOTAL SAMPLE	MONTHS ACTIVE FEDERAL MILITARY SERVICE					
		1-48	49-96	97-144	145-192	193-240	241+
"I FOUND MY JOB"							
DULL	9	8	11	8	9	7	11
SO-SO	12	14	14	7	12	8	18
INTERESTING	71	70	70	77	68	75	64
NO REPLY	8	8	5	8	11	10	7
"MY JOB UTILIZES MY TALENTS"							
NOT AT ALL OR VERY LITTLE	20	21	22	19	20	18	18
FAIRLY WELL TO VERY WELL	65	67	61	66	58	62	71
EXCELLENTLY OR PERFECTLY	13	10	15	14	20	18	11
NO REPLY	2	2	2	1	2	2	-
"MY JOB UTILIZES MY TRAINING"							
NOT AT ALL OR VERY LITTLE	23	23	26	19	24	18	32
FAIRLY WELL TO VERY WELL	63	66	61	64	57	59	54
EXCELLENTLY OR PERFECTLY	13	10	12	16	17	21	14
NO REPLY	1	1	1	1	2	2	-

RESPONSE

RESPONSE	TOTAL SAMPLE	MONTHS ACTIVE FEDERAL MILITARY SERVICE					
		1-48	49-96	97-144	145-192	193-240	241+
"I FOUND MY JOB"							
DULL	8	9	6	10	6	8	8
SO-SO	12	12	15	10	8	6	12
INTERESTING	72	72	69	74	80	77	69
NO REPLY	8	7	10	6	6	9	11
"MY JOB UTILIZES MY TALENTS"							
NOT AT ALL OR VERY LITTLE	20	24	15	18	13	16	8
FAIRLY WELL TO VERY WELL	66	67	72	64	64	55	61
EXCELLENTLY OR PERFECTLY	12	8	11	17	22	27	28
NO REPLY	2	1	2	1	1	2	3
"MY JOB UTILIZES MY TRAINING"							
NOT AT ALL OR VERY LITTLE	17	19	13	16	13	17	14
FAIRLY WELL TO VERY WELL	68	69	76	67	65	53	59
EXCELLENTLY OR PERFECTLY	12	9	10	16	19	24	27
NO REPLY	3	3	1	1	3	6	-

TABLE 29
REENLISTMENT INTENTIONS OF SURVEY SAMPLE
(PERCENT RESPONDING)

	545X0			547X0		
	<u>1ST</u> <u>TERM</u>	<u>2ND</u> <u>TERM</u>	<u>CAREER</u>	<u>1ST</u> <u>TERM</u>	<u>2ND</u> <u>TERM</u>	<u>CAREER</u>
YES, OR PROBABLY YES	36	32	22	38	59	66
NO, OR PROBABLY NO	51	57	65	50	28	19
NO REPLY	13	11	13	12	13	15

TABLE 30
ACTUAL REENLISTMENT RATES FOR 545X0 AND 547X0 PERSONNEL
1 OCTOBER 1976 - 30 JUNE 1977

	<u>1ST</u> <u>TERM</u>	<u>2ND</u> <u>TERM</u>	<u>CAREER</u>	<u>1ST</u> <u>TERM</u>	<u>2ND</u> <u>TERM</u>	<u>CAREER</u>
ELIGIBLE TO REENLIST	77	43	79	99	38	75
ACTUALLY REENLISTED	29	32	72	38	20	72
REENLISTMENT RATE	37.7%	74.4%	91.1%	3.4%	52.6%	96.0%

COMPARISON OF CURRENT SURVEY TO PREVIOUS SURVEY

The results of this survey were compared to those of Occupational Survey Report 90-545-019, dated 1 March 1971. The comparison resulted in the following conclusions:

1. Both surveys resulted in similar career ladder structure analysis, with both surveys identifying a supervision group, refrigeration and air conditioning systems groups, heating systems groups, boiler maintenance personnel, and plant operators. The fuel area NCO and training instructor groups were not identified in the 1971 report.
2. Task performance of incumbents in each of the various skill level, AFMS groups, CONUS and overseas groups was found to have changed very little since the 1971 study. No major differences were noted between the two reports.

SUMMARY OF FINDINGS

1. The task performance of personnel in both the Refrigeration and Air Conditioning (AFSC 545X0) and the Heating Systems career ladders (AFSC 547X0) was found to be very homogeneous within each specific career ladder. Tasks being performed and the time spent on these tasks varied very little across DAFSC groups. Basically, airmen in each career ladder worked exclusively with equipment specifically used with either refrigeration and air conditioning systems or with heating systems. Equipment commonality between AFSCs was low. Where common tasks were found, they primarily involved maintenance of common mechanical and electrical components such as filters, blowers, fans, motors, valves, fuses, or ducting. Thus, the survey data tend to validate the existing classification structure for these specialties.
2. A review of both the 545X0 and 547X0 STSs should be made by appropriate personnel to consider the addition of several commonly performed tasks not currently included in the STSs. In addition, the paragraphs in STS 545X0 appear confusing and at times repetitious. Better organization of the main paragraphs and more concise listing of task statements under each paragraph would allow for better clarity and remove much of the seemingly repetition in the listing of responsibilities and tasks.

APPENDIX A

GROUP ID NUMBER AND TITLE: GRP038 - Refrigeration and Air Conditioning Specialists

NUMBER OF INCUMBENTS: N=962

MAJOR COMMAND DISTRIBUTION: SAC (23%), TAC (22%), ADC (12%), MAC (9%),
ATC (8%), USAFE (5%), AFSC (4%), PACAF (5%),
Others (12%)

LOCATION: CONUS (82%), Overseas (18%)

DAFSC DISTRIBUTION: 54530 (16%), 54550 (68%), 54570 (16%)

AVERAGE GRADE: 3.9

AMOUNT OF SUPERVISION: 26% supervise an average of one subordinate

AVERAGE TIME IN CAREER FIELD: 55 months

AVERAGE TIME IN SERVICE: 73 months

EXPRESSED JOB INTEREST: Dull (7%), So-So (12%), Interesting (73%), No Reply (8%)

PERCEIVED UTILIZATION OF TALENTS: Little Or Not At All 19%
Fairly Well Or Better 81%

PERCEIVED UTILIZATION OF TRAINING: Little Or Not At All 21%
Fairly Well Or Better 79%

AVERAGE NUMBER OF TASKS PERFORMED: 133

TIME SPENT ON DUTIES:

DUTY

AVERAGE PERCENT TIME
SPENT BY ALL MEMBERS

I MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING SYSTEMS COMPONENTS	22
J MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING ELECTRICAL SYSTEMS	13
G SERVICING AND OVERHAULING MAJOR COMPONENTS OF REFRIGERATION AND AIR CONDITIONING SYSTEMS	11
E MAINTAINING AND SERVICING AIR CONDITIONING SYSTEMS	10
F MAINTAINING AND SERVICING REFRIGERATION SYSTEMS	8
H MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING CONTROL SYSTEMS	7

GRP038

REPRESENTATIVE TASKS:

<u>TASKS</u>	<u>PERCENT MEMBERS PERFORMING</u>
I13 INSPECT, CLEAN, OR REPLACE FILTERS	94
I11 INSPECT, CLEAN, OR LUBRICATE MOTOR OR FAN BEARINGS	92
G10 INSPECT COMPRESSORS OR SYSTEM COMPONENTS FOR REFRIGERANT LEAKS	91
I24 PUMP DOWN, PURGE, OR EVACUATE UNITS OF REFRIGERATION OR AIR CONDITIONING SYSTEMS	90
J5 INSPECT MOTORS	89
E18 PERFORM SEASONAL OR RECURRING MAINTENANCE ON AIR CONDITIONING SYSTEMS	87
F10 PERFORM SEASONAL OR RECURRING MAINTENANCE ON REFRIGERATION SYSTEMS	83
G2 CLEAN OR REPLACE COMPONENTS ON EVAPORATORS	83

GROUP ID NUMBER AND TITLE: GRP044 - Heating Systems Specialists

NUMBER OF INCUMBENTS: N=924

MAJOR COMMAND DISTRIBUTION: SAC (25%), TAC (15%), MAC (15%), ATC (11%),
AAC (6%), ADC (5%), USAFE (5%), AFLC (4%),
AFSC (4%), PACAF (4%), Others (6%)

LOCATION: CONUS (81%), Overseas (19%)

DAFSC DISTRIBUTION: 54730 (14%), 54750 (74%), 54770 (9%), Others (3%)

AVERAGE GRADE: 3.8

AMOUNT OF SUPERVISION: 19% supervise an average of one subordinate

AVERAGE TIME IN CAREER FIELD: 53 months

AVERAGE TIME IN SERVICE: 59 months

EXPRESSED JOB INTEREST: Dull (8%), So-So (12%), Interesting (73%), No Reply (7%)

PERCEIVED UTILIZATION OF TALENTS: Little Or Not At All 19%
Fairly Well Or Better 81%

PERCEIVED UTILIZATION OF TRAINING: Little Or Not At All 16%
Fairly Well Or Better 84%

AVERAGE NUMBER OF TASKS PERFORMED: 114

TIME SPENT ON DUTIES:

<u>DUTY</u>	<u>AVERAGE PERCENT TIME SPENT BY ALL MEMBERS</u>
O MAINTAINING AND OPERATING STEAM HEATING SYSTEMS	27
I MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING SYSTEMS COMPONENTS	16
K INSTALLING AIR CONDITIONING, REFRIGERATION, AND HEATING SYSTEMS	11
P MAINTAINING AND OPERATING HOT WATER HEATING SYSTEMS	10
S TREATING AND TESTING WATER	8
J MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING ELECTRICAL SYSTEMS	7

GRP044

REPRESENTATIVE TASKS:

<u>TASKS</u>	<u>PERCENT MEMBERS PERFORMING</u>
K35 MEASURE, CUT, OR THREAD PIPE	89
04 BLOW DOWN BOILERS OR WATER COLUMNS	84
015 INSPECT FOR PROPER WATER LEVEL IN BOILERS	83
I11 INSPECT, CLEAN, OR LUBRICATE MOTOR OR FAN BEARINGS	81
I25 REMOVE OR INSTALL CHECK VALVES	81
048 REMOVE OR INSTALL STEAM HEATING SYSTEM VALVES OR FITTINGS	78
P8 INSTALL, MAINTAIN, OR PERFORM MAINTENANCE ON CIRCULATING PUMPS	76
K13 INSTALL OR MAINTAIN OIL BURNERS	74
C1 ANALYZE CAUSES OF HEATING SYSTEMS MALFUNCTIONS	70

GROUP ID NUMBER AND TITLE: GRP040 - Supervisory Personnel

NUMBER OF INCUMBENTS: N=216

MAJOR COMMAND DISTRIBUTION: SAC (23%), ATC (13%), ADC (10%), TAC (10%),
MAC (10%), USAFE (10%), AFLC (7%), PACAF (4%),
Others (13%)

LOCATION: CONUS (79%), Overseas (21%)

DAFSC DISTRIBUTION: 54550 (5%), 54570 (23%), 54750 (6%), 54770 (33%),
54790 (32%), No reply (1%)

AVERAGE GRADE: 6.5

AMOUNT OF SUPERVISION: 86% supervise an average of 6 subordinates

AVERAGE TIME IN CAREER FIELD: 167 months

AVERAGE TIME IN SERVICE: 205 months

EXPRESSED JOB INTEREST: Dull (13%), So-So (9%), Interesting (70%), No Reply (8%)

PERCEIVED UTILIZATION OF TALENTS: Little Or Not At All 19%
Fairly Well Or Better 81%

PERCEIVED UTILIZATION OF TRAINING: Little Or Not At All 18%
Fairly Well Or Better 82%

AVERAGE NUMBER OF TASKS PERFORMED: 79

TIME SPENT ON DUTIES:

DUTY

AVERAGE PERCENT TIME
SPENT BY ALL MEMBERS

B DIRECTING AND IMPLEMENTING	30
A ORGANIZING AND PLANNING	21
C EVALUATING	17
D TRAINING	11

GRP040

REPRESENTATIVE TASKS:

<u>TASKS</u>	<u>PERCENT MEMBERS PERFORMING</u>
B4 COUNSEL PERSONNEL ON MILITARY-RELATED PROBLEMS	93
B3 COMPLETE AIRMAN PERFORMANCE REPORTS	88
B15 ORIENT NEWLY ASSIGNED PERSONNEL	85
C12 EVALUATE PERFORMANCE OF SUBORDINATES	79
B7 DIRECT FLOW OF WORK	74
C5 CONDUCT QUALITY INSPECTIONS AFTER MAINTENANCE IS PERFORMED	70
B10 IMPLEMENT TRAINING PROGRAMS	70

GROUP ID NUMBER AND TITLE: GRP061 - Training Instructors

NUMBER OF INCUMBENTS: N=24

MAJOR COMMAND DISTRIBUTION: ATC (96%), AFLC (4%)

LOCATION: CONUS (100%)

DAFSC DISTRIBUTION: 54550 (29%), 54570 (38%), 54750 (17%), 54770 (12%),
54790 (4%)

AVERAGE GRADE: 5.7

AMOUNT OF SUPERVISION: 8% supervise an average of one subordinate

AVERAGE TIME IN CAREER FIELD: 139 months

AVERAGE TIME IN SERVICE: 148 months

EXPRESSED JOB INTEREST: So-So (8%), Interesting (88%), No Reply (4%)

PERCEIVED UTILIZATION OF TALENTS: Little Or Not At All 8%
Fairly Well Or Better 92%

PERCEIVED UTILIZATION OF TRAINING: Little Or Not At All 4%
Fairly Well Or Better 96%

AVERAGE NUMBER OF TASKS PERFORMED: 40

TIME SPENT ON DUTIES:

<u>DUTY</u>	<u>AVERAGE PERCENT TIME SPENT BY ALL MEMBERS</u>
D TRAINING	49
B DIRECTING AND IMPLEMENTING	10
A ORGANIZING AND PLANNING	8
H MAINTAINING REFRIGERATION, AIR CONDITIONING, AND HEATING CONTROL SYSTEMS	7
E MAINTAINING AND SERVICING AIR CONDITIONING SYSTEMS	5

GRP061

REPRESENTATIVE TASKS:

<u>TASKS</u>	<u>PERCENT MEMBERS PERFORMING</u>
D6 COUNSEL INDIVIDUALS ON TRAINING PROGRESS	100
D15 PREPARE LESSON PLANS	96
D4 CONDUCT CLASSROOM TRAINING	92
D8 DEMONSTRATE OPERATION OF EQUIPMENT	92
D1 ADMINISTER OR SCORE TESTS	92
D17 REVIEW PROGRESS OF INDIVIDUALS IN TRAINING	88
D13 PLAN TRAINING AIDS	83

GROUP ID NUMBER AND TITLE: GRP147 - Fuel Area NCOs

NUMBER OF INCUMBENTS: N=5

MAJOR COMMAND DISTRIBUTION: USAF (60%), SAC (20%), No Reply (20%)

LOCATION: CONUS (20%), Overseas (80%)

DAFSC DISTRIBUTION: 54750 (100%)

AVERAGE GRADE: 4.0

AMOUNT OF SUPERVISION: None

AVERAGE TIME IN CAREER FIELD: 72 months

AVERAGE TIME IN SERVICE: 81 months

EXPRESSED JOB INTEREST: So-So (40%), Interesting (60%)

PERCEIVED UTILIZATION OF TALENTS: Little Or Not At All 20%
Fairly Well Or Better 80%

PERCEIVED UTILIZATION OF TRAINING: Little Or Not At All 60%
Fairly Well Or Better 40%

AVERAGE NUMBER OF TASKS PERFORMED: 6

TIME SPENT ON DUTIES:

DUTY

AVERAGE PERCENT TIME
SPENT BY ALL MEMBERS

R MAINTAINING FUEL AREAS
A ORGANIZING AND PLANNING
B DIRECTING AND IMPLEMENTING
M MAINTAINING EVAPORATIVE COOLERS, CONDENSERS,
AND COOLING TOWERS
K INSTALLING AIR CONDITIONING, REFRIGERATION,
AND HEATING SYSTEMS

61
20
10
5
3

REPRESENTATIVE TASKS:

TASKS

PERCENT MEMBERS
PERFORMING

R5 INSPECT OIL TANKS FOR WATER OR OTHER
IMPURITIES
R13 VERIFY QUANTITY OF FUEL OIL IN TANKS
R4 INSPECT GAS OR OIL FUEL LINES OR FITTINGS
A17 INITIATE DAILY ACTIVITY REPORTS
R3 INSPECT COAL SHIPMENTS

100
80
80
40
40